EPA Announces Proposed Cleanup Plan for Wrigley Charcoal Site

U.S. EPA Region 4 **Wrigley, Hickman County, Tennessee** **May 2003**

PROPOSED PLAN SUMMARY SHEET

Site Description:
The Wrigley Charcoal Site is in the town of Wrigley, Hickman County, Tennessee. The site is a partially abandoned industrial complex that was used for charcoal production, wood distillation, and pig iron blast furnace operations. Site activities occurred in four separate areas: Primary Site, Storage Basin, Irrigation Field, and Athletic Field (Site location map on the back of the summary sheet; see page 2 of the fact sheet for more information.)

Site Contaminants of Concern:
Tar, tar byproducts and pesticides (naphthalene; benzene; 2,4-dimethylphenol; 2-methylphenol; (3-and/or 4-) methylphenol) (For more information, see page 4 of the fact sheet.)

Health Risks:
The Wrigley site does not pose a significant risk to people based on current populations and current uses of the four separate site areas. Contaminated groundwater, however, could pose a potential risk to future residents if they installed drinking water wells in affected areas. (For more information, see page 8 of the fact sheet.)

Ecological Risks:
The Wrigley site does not pose a significant risk to birds or small mammals based on the tissue study results and current conditions on the Primary Site. (For more information, see page 8 of the fact sheet.)

EPA's Preferred Alternative:
Based on available information, EPA is proposing soil alternative S2 and groundwater alternative GW4 as the preferred alternative for the Wrigley site.

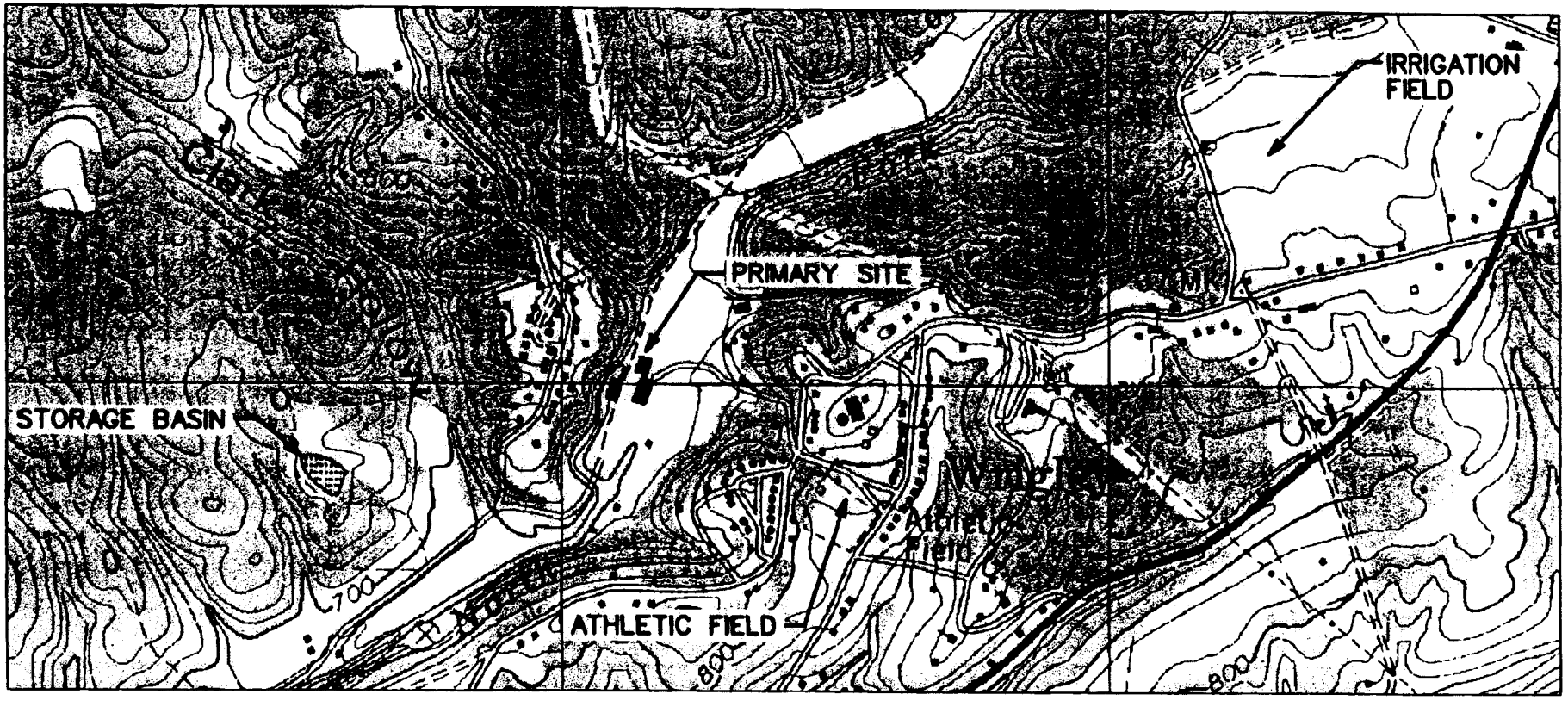
Soil: Alternative S2: Excavation and Landfill Disposal of Contaminated Soil from Primary Site-South and Storage Basin; Land Use Restrictions

Groundwater: Alternative GW4: In Situ Bioremediation with Oxygen Releasing Compound (ORC);waterline extension to the nearest downgradient residential property

EPA believes that this preferred alternative, S2 plus GW4, provides the best balance in meeting the evaluation criteria. Total estimated cost for EPA's preferred alternative is $5.4 million. (For more information, see pages 9 through 14 of the fact sheet.)

Community Involvement Opportunities:

Public Meeting: Thursday, May 29, at 7 p.m., at the East Hickman Elementary School, on Hwy 100 in Lyles
Public Comment Period: May 19 to June 17, 2003
Wrigley Site Information Repository: Hickman County Main Library, 120 W. Swan St., Centerville,
(For more information, see page 14 of the fact sheet)



SITE LOCATION MAP
WRIGLEY CHARCOAL
HICKMAN COUNTY, TENNESSEE

FIGURE
1

EPA Announces Proposed Cleanup Plan for Wrigley Charcoal Site

U.S. EPA Region 4 | **Wrigley, Hickman County, Tennessee** | **May 2003**

Introduction

The U.S. Environmental Protection Agency (EPA), in cooperation with the Tennessee Department of Environment and Conservation (TDEC), invites community members to attend a public meeting on Thursday, May 29, beginning at 7 p.m., at East Hickman Elementary School in Lyles, Tennessee.

The meeting will feature the results of a study conducted by EPA that evaluated alternatives to clean up contaminated soil and groundwater at the Wrigley Charcoal (Wrigley) site in Wrigley, Tennessee. EPA will make a decision about the cleanup plan for the site after considering all public comments received. The alternative that EPA selects will be implemented as the final cleanup for the Wrigley site.

EPA will accept public comments on the alternatives and the preferred cleanup alternative for the Wrigley site from May 19 through June 17, 2003. Community members will have the opportunity to review, ask questions, and discuss the alternatives with EPA representatives at the May 29 meeting.

This fact sheet summarizes the alternatives evaluated and the preferred cleanup alternative proposed for the Wrigley site. It also contains site background information, risk assessment results, and locations for more information about the Wrigley site. EPA encourages the public to review site information, attend the May 29 public meeting, and comment on the alternatives and final cleanup plan proposed for the Wrigley site.

Community Involvement Opportunities

Public Comment Period

May 19 to June 17, 2003

Public Meeting

Thursday, May 29, 2003, 7:00 p.m.
East Hickman Elementary School
5191 Highway 100, Lyles, TN

Information is available for review

at the Wrigley Information Repository
at the
Hickman County Main Library in Centerville
and online at:
www.epa.gov/region4/waste/npl/npltn/wrigletn.htm

EPA Contacts

Loften Carr
Remedial Project Manager
U.S. Environmental Protection Agency
Phone: 404-562-8804
E-mail: Carr.Loften@epa.gov

Diane Barrett
Community Involvement Coordinator
U.S. Environmental Protection Agency
Phone: 404-562-8489
E-mail: Barrett.Diane@epa.gov

EPA toll-free number: 1-800-435-9233

Section 117(A) of the Comprehensive Environmental Response, Compensation, and Liability Act (commonly called CERCLA or Superfund) requires publication of a notice and a Proposed Plan for possible site remediation. The Proposed Plan must also be made available to the public for comment. This Proposed Plan is a summary of information included in the Focused Feasibility Study (May 2003) and other documents in the Administrative Record for the Wrigley site. For more detailed information, please consult the Focused Feasibility Study, along with other documents in the Administrative Record, at the Hickman County Main Library in Centerville, Tennessee.

Background Information

The Wrigley site is about 45 miles west of Nashville, in the town of Wrigley, Hickman County, Tennessee. The site is a partially abandoned industrial complex that was used for charcoal production, wood distillation, and pig iron blast furnace operations. Site activities occurred in four separate areas: Primary Site, Storage Basin, Irrigation Field, and Athletic Field. Figure 1 on page 3 shows the site layout.

The Primary Site is at the bottom of a steep-walled valley and covers about 35 acres, most of which is east of the North Fork of Mill Creek.

The Storage Basin is about 1,400 feet west-southwest of the Primary Site and about 90 feet higher in elevation. The Storage Basin covers about 2.5 acres and includes the Former Storage Basin and the Former Overflow Basin. The Storage Basin has been cleaned up, graded, and planted with grass. The Goodreau property is adjacent to the Storage Basin and covers about 35 acres. A road to the Storage Basin likely passed through the Goodreau property, possibly spreading contamination to this property.

The Irrigation Field is about 3,500 feet east-northeast of the Primary Site and about 140 feet higher in elevation. The field covers about 40 acres.

The Athletic Field covers about 3.5 acres and is located approximately 800 feet southeast of the Primary Site, bordering a residential area in the eastern part of the Wrigley community. From 1938 to 1950, this area was filled with blast furnace slag and waste from the Primary Site. Later, this area was converted to an athletic field; now, it is regularly used for softball.

From 1881 to 1966, several owners used the Primary Site for industrial operations, such as producing iron, charcoal, and wood distillation products. Mill Creek received most of the waste from the Wrigley site until the mid 1940s, when the State of Tennessee requested that the owners identify other waste disposal methods. As a result of this request, wastewater impoundments were built, and spray irrigation or trickling filter methods were tried in an attempt to degrade wastewater that contained tar byproducts, such as phenols and polynuclear aromatic hydrocarbons (PAHs). Attempts to reduce or impound contaminated wastewater inadvertently led to additional areas of contamination (Storage Basin and Irrigation Field). Later studies did not identify contamination in Mill Creek.

Contamination also spread because of the overall poor condition of the Primary Site facility, where spills of volatile organic compounds and semivolatile organic compounds were commonplace. (Volatile and semivolatile compounds are chemicals that evaporate quickly when exposed to air.) Contaminated site wastewater was disposed of in the Storage Basin and Irrigation Field from the 1940s to the mid 1960s.

In 1988, EPA declared the Wrigley site an imminent and substantial danger and conducted a response action to stabilize the tar pits and prevent a major release to Mill Creek. In 1989, EPA listed the Wrigley site on the National Priorities List, (the list of abandoned hazardous waste sites eligible for Superfund cleanup money). Also, the State of Tennessee authorized relocation of the downstream Bon Aqua-Lyles Water District primary water intake.

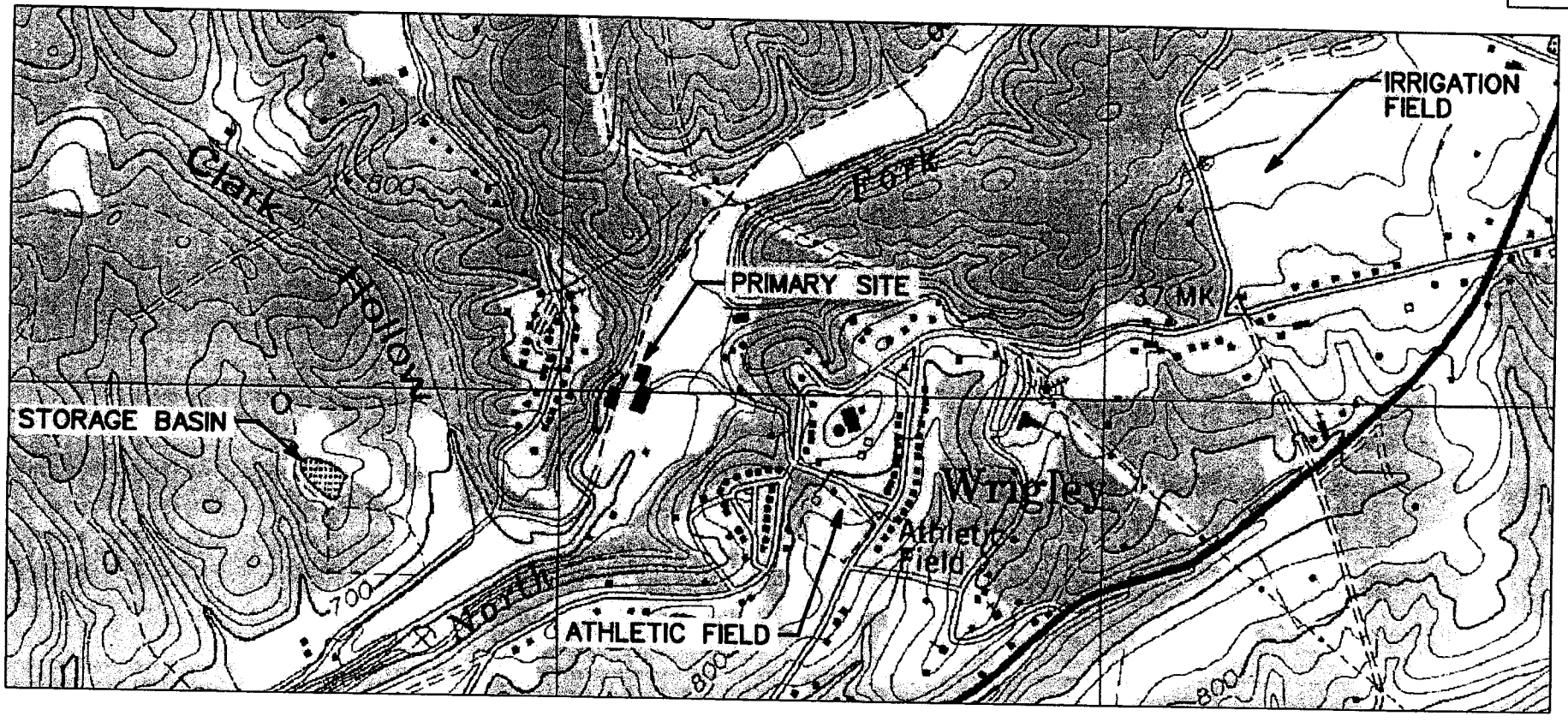
From 1989 to 1991, EPA conducted a remedial investigation for the four parts of the Wrigley site and a feasibility study for the Primary Site and Storage Basin. The investigation was done to determine the nature and extent of contamination at the site; the feasibility study evaluated cleanup alternatives for the Primary Site and Storage Basin.

Significant contamination was identified at the Primary Site. In addition, Mill Creek and shallow groundwater were found to contain phenols, PAHs, volatile organic compounds, and metals. Low to moderate levels of contamination were identified in shallow groundwater at the southern end of the Primary Site. No contamination was detected in offsite groundwater, surface water, or in residential wells surrounding the site.

In September 1991, EPA signed an interim action record of decision to address immediate threats of direct contact with contamination at the Primary Site. EPA and TDEC conducted the interim cleanup action in two phases between September 1993 and July 1995.

Phase I of the interim cleanup action was conducted from September 1993 through February 1995. Contaminated soil at the Primary Site was excavated; this soil, along with transformers and other waste containing hazardous substances, was disposed of off site.

Phase II of the interim cleanup action was conducted from June 1 to July 10, 1995, and addressed the Storage Basin and Overflow Basin areas of the site. Contaminated material and soil were excavated from both locations and disposed of off site; water from the basins was aerated and discharged to Clark Hollow.



SITE LOCATION MAP
WRIGLEY CHARCOAL
HICKMAN COUNTY, TENNESSEE

FIGURE
1

In June 1999, EPA conducted a field investigation at the Primary Site, 5 acres of which had been purchased for use as an industrial recycling operation. Included on the recycling operation property are the Dryer Building, Maintenance Building, and Carpenter Shed. Several areas of the recycling property have been filled with soil and various types of plastics; debris is stored in the open across the site.

Test results showed contamination from volatile and semivolatile organic compounds, mainly in the groundwater monitoring well next to the Storage Tank Foundation in the southern part of the Primary Site. Significant levels of contamination from volatile and semivolatile organic compounds and metals were also detected in surface and subsurface soils across the Primary Site. Contamination at the Primary Site is associated with historic operations, not the current recycling operation.

EPA conducted a supplemental remedial investigation in 2001 and 2002, collecting samples from surface and subsurface soils, surface water, sediment, and groundwater at the Primary Site and Storage Basin. EPA also collected surface soil, subsurface soil, and groundwater samples at the Irrigation Field and Athletic Field, and groundwater samples from 13 monitoring wells (four existing wells and nine new wells). Two of the new monitoring wells are downgradient of the Primary Site and screened in the bedrock aquifer. Private water wells and springs near the site also were sampled.

In November 2002, EPA collected additional surface soil, sediment, surface water, and potable well samples. Surface soil and sediment samples also were collected from the Goodreau property.

Site Characteristics

Based on various studies, EPA has made the following conclusions about the Wrigley site:

- Soil in the south part of the Primary Site is contaminated with wood tar chemicals. Tars have been seen from south of the Product Tank Foundation to a point near the North Fork of Mill Creek, south of the Carpenter Shed, including the Carpenter Shed and Former Tank Foundation. Analytical results of pure tar showed high phenol contamination, as well as benzene contamination. Some tar has bubbled to the surface during hot weather and can come into contact with rainwater, which can leach into groundwater. As a result, the area of visible tar is considered the source area for potential groundwater contamination in the south part of the Primary Site. This source area is estimated to be 8 feet deep, with about 2 feet in the saturated (groundwater) zone. Figure 2 shows the source area.
- The following contaminants, benzene;2,4-dimethylphenol; 2-methylphenol; (3-and/or 4-) methylphenol; naphthalene, are in shallow groundwater in the south part of the Primary Site, under the Storage Tank Foundation, Carpenter Shed, and Former Stillhouse Foundation (Figure 3). Trace amounts of metals, such as arsenic, and higher levels of common metals, such as iron, also are present. EPA has determined that the low level of arsenic detected poses an insignificant risk because it has not been found at higher levels in surrounding potable water wells.

- Surface soil at the Goodreau property has visible tar, particularly along the former roadways to the Storage Basin (Figure 4). Tar is also present downgradient of the Storage Basin, at the confluence of the North Fork of Mill Creek and a tributary along Oak Hill Road, opposite the Goodreau property. These source areas of potential groundwater contamination are in surface soil (soil to a depth of one foot).

Scope and Role of Cleanup Action

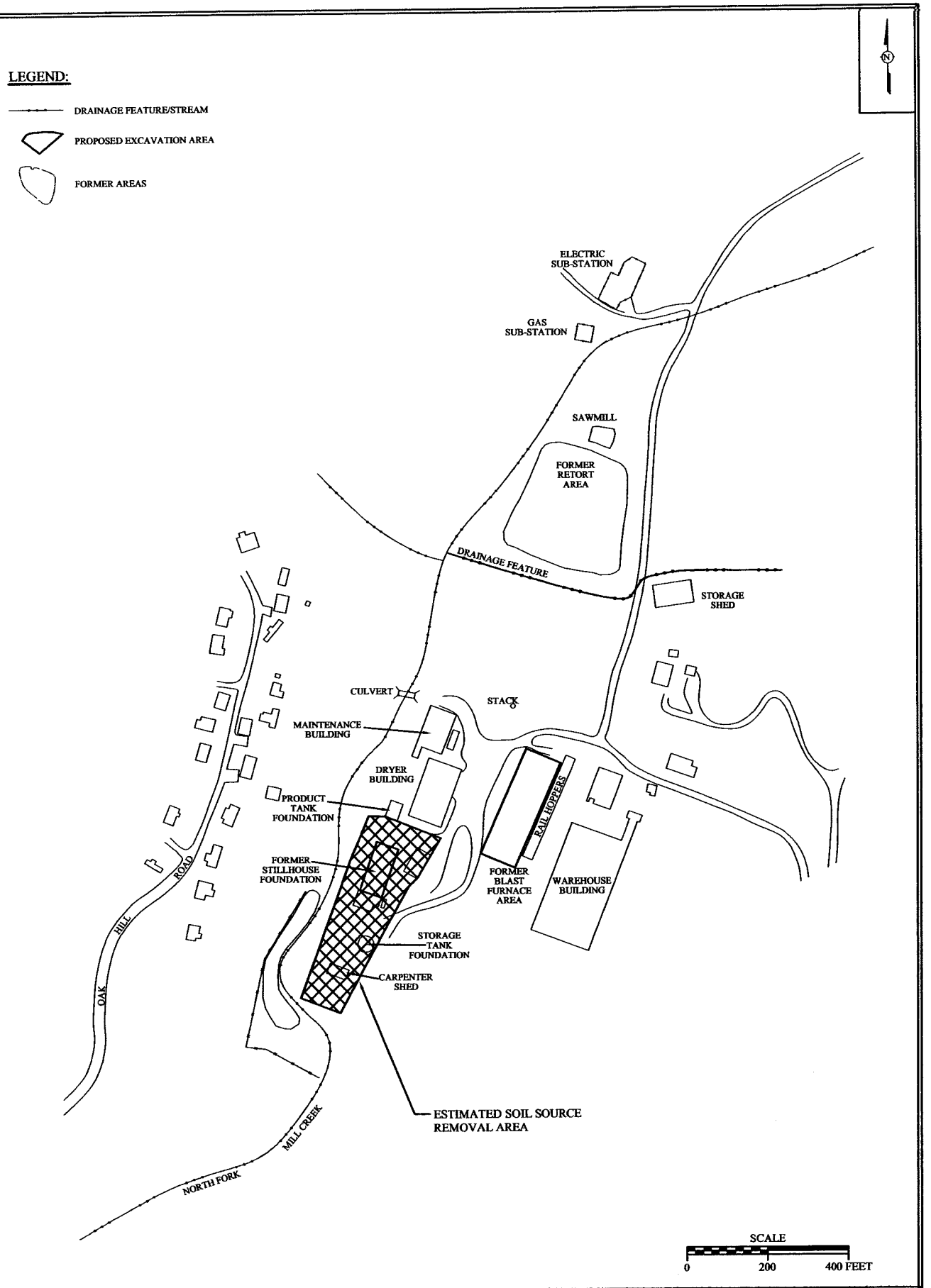
EPA's preferred alternative for the Wrigley site described in this fact sheet is intended to be the final cleanup for the site. EPA's proposed site-wide remedy will address the following areas of contamination:

Site and Medium	Contamination
Primary Site-South soil source area	tar
Groundwater	tar byproducts and pesticides (naphthalene; benzene; 2,4-dimethylphenol; 2-methylphenol; (3-and/or 4-) methylphenol)
Storage Basin soil source area	tar
Goodreau Property soil source area	tar

Summary of Site Risks

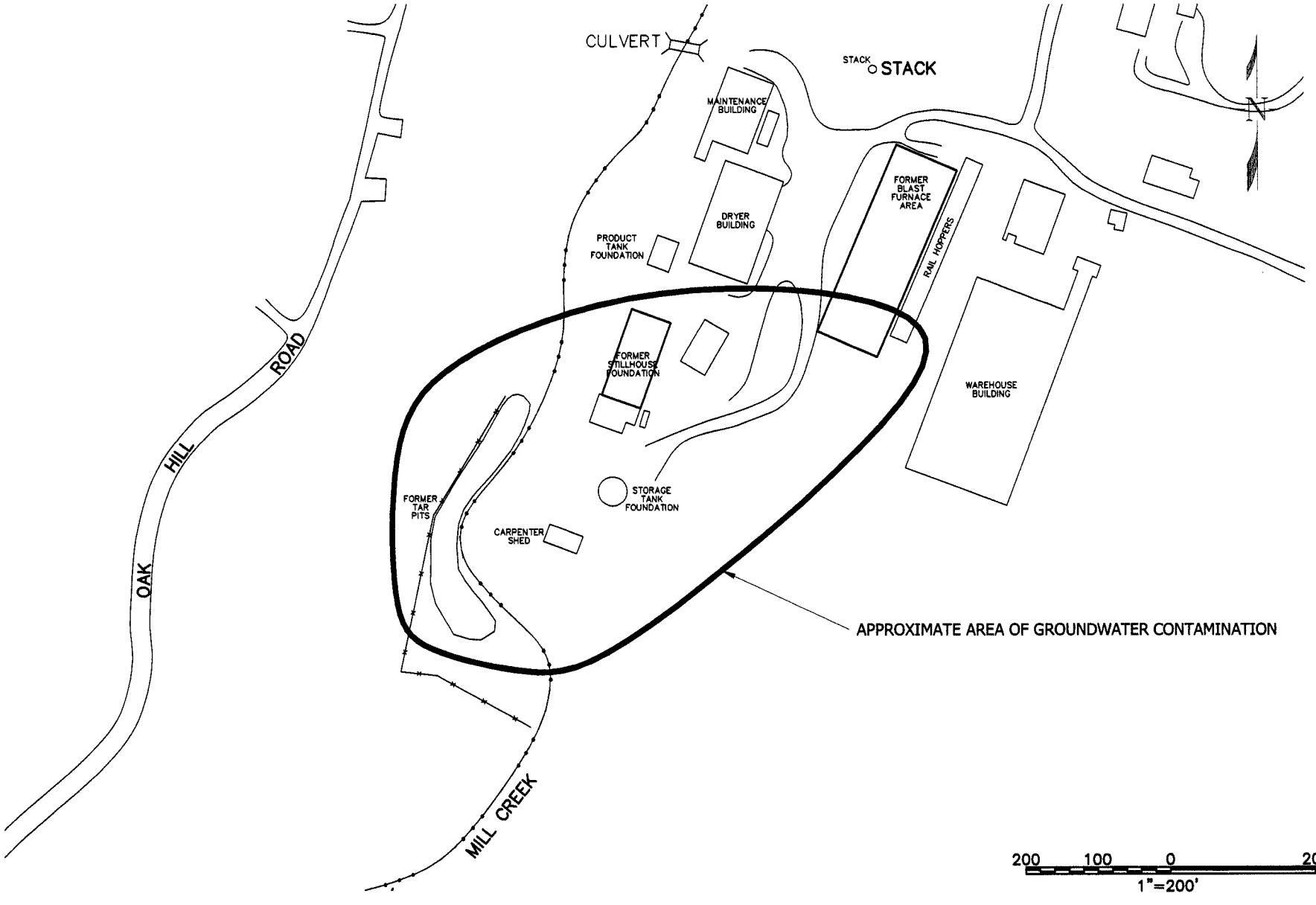
As part of the focused feasibility study, a baseline human health risk assessment was conducted to evaluate human health risks associated with current and future site conditions. Also, a screening level ecological risk assessment was completed to evaluate risk to the environment from site contaminants.

Human health exposure pathways evaluated included ingestion, inhalation, and skin contact with surface soils,



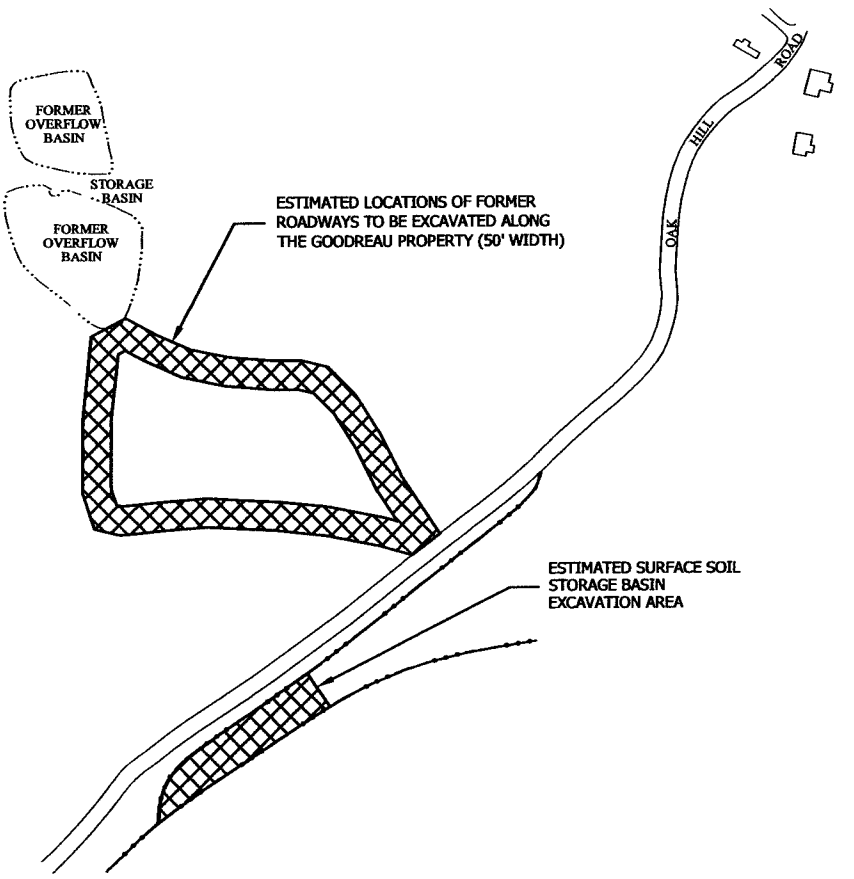
SOIL SOURCE MAP
WRIGLEY CHARCOAL, PRIMARY SITE–SOUTH
HICKMAN COUNTY, TENNESSEE

FIGURE 2



SURFICIAL GROUNDWATER MAP
APPROXIMATE AREA OF CONTAMINATION
WRIGLEY CHARCOAL, PRIMARY SITE–SOUTH
HICKMAN COUNTY, TENNESSEE

FIGURE
3



LEGEND:

DRAINAGE FEATURE/STREAM

PROPOSED EXCAVATION AREA

FORMER AREAS

SCALE

0 200 400 FEET

SOIL SOURCE MAP
WRIGLEY CHARCOAL, STORAGE BASIN/GOODREAU PROPERTY
HICKMAN COUNTY, TENNESSEE

FIGURE 4

subsurface soils, and groundwater, as well as ingestion and dermal contact with sediments and surface water. The risk assessment considered industrial use of the Primary Site and residential use for the Storage Basin, Athletic Field, and Irrigation Field.

Ecological exposure pathways evaluated include direct and indirect exposure of birds and small mammals to site sediment and surface water.

Human Health Risks

Health risks are evaluated to determine whether chemicals can cause cancer or non-cancer illness. The Wrigley site does not pose a significant risk to people based on current populations and current uses of the four separate site areas. Contaminated groundwater, however, could pose a potential risk to future residents if they installed drinking water wells in affected areas.

Tar in soil on the southern half of the Primary Site is a likely cause of the groundwater contamination at the Primary Site and immediately downgradient of the Primary Site. Therefore, EPA plans to remove the contaminated soil on the southern half of the Primary Site.

Exposure to soil at the Irrigation Field and Athletic Field would not pose an unacceptable risk for future residential use. However, the installation of drinking water wells would not be allowed until groundwater cleanup standards are met.

In addition, although residential exposure was evaluated for the Irrigation Field and the Athletic Field, residential use is unlikely in the near future. Therefore, potential future risk can be addressed by restrictions on the installation of drinking water wells in these two areas.

Also, some exposure scenarios were based on construction workers who may be exposed to deeper soils, where copper and iron could be present. Given the low toxicity of these metals at the levels measured during the site investigation, cleanup action for iron and copper in soil is not necessary.

Ecological Risks

Potential impacts to small animals and other creatures were evaluated by several methods, including tests of tissue from small mammals, tests of effects on worms living in contaminated soil, and a quantitative risk assessment. Studies were conducted in 1995 and 2002.

According to the 1995 study, soil from the site was not acutely toxic to earthworms, with limited accumulation of site contaminants in earthworm tissues. Also, small mammals at the site were not adversely affected by exposure to site contaminants and had little or no accumulation of site contaminants in biological tissues.

The 2002 assessment indicated that potential impact to birds and small mammals was possible based on direct and indirect exposure to contaminated soil. The potential impact came primarily from a worst case scenario for zinc and copper in the soil on the southern half of the Primary Site. The worst case scenario did not take into account the favorable results of the 1995 tissue study nor that the Primary Site is covered with debris, making it a less desirable habitat. Therefore, the Site does not pose a significant risk to birds or small mammals based on the tissue study results and current conditions on the Primary Site.

Contamination Pathways

EPA investigated the persistence and mobility of each chemical of concern to determine the potential for each chemical to break down or move. Potential contaminant pathways include soil, groundwater, surface water, sediment, and air.

Under normal soil conditions, pesticides and PCBs are immobile and not expected to move in soil. Pesticides in site soil will remain attached to soil at the depths where they were found and are not expected to move. Semivolatile organic compounds, such as PAHs, do not break down unless treated; therefore, EPA expects that they will remain where they are in site soil.

Rainwater percolating through contaminated areas, carrying contaminants into the groundwater, is an important pathway. Tars in site soil may be a continuing source of groundwater contamination. However, additional semivolatile organic compounds from site soil are not expected to leach into the groundwater; mostly because the Primary Site is covered with impermeable material.

The exception is when tars bubble up at the Primary Site and Storage Basin. These tars can come into contact with rainwater. Although the source of the semivolatile organic compounds in groundwater is unknown, it may be from discharges of liquid contaminants during mill operation and tars leaching into the groundwater.

EPA has determined that actual or threatened releases of hazardous substances from the Wrigley site, if not addressed by the preferred alternative or one of the other active measures under consideration, may present a threat or potential threat to human health, welfare, or the environment.

Cleanup Objectives

EPA developed three cleanup objectives for the Wrigley site:

1. Protect future residents from exposure to unacceptable levels of chemicals in soil and groundwater.
2. Prevent the spread of contamination in soil and groundwater to protect natural resources.
3. Reduce or eliminate the source of contamination by cleaning up soil in areas where tar is visible.

EPA proposes the following actions to meet these objectives:

- Clean up surface soil contamination at the Goodreau property.
- Clean up tars at the Primary Site-South and Storage Basin to reduce contamination from the soil entering the groundwater.

Cleanup Alternatives

EPA developed two sets of cleanup alternatives: one for soil and the other for groundwater. The final cleanup remedy for the Wrigley site will be made up of a soil alternative and a groundwater alternative.

Soil Alternatives

Alternative S1: No Action
A no-action alternative is required by Superfund regulations to serve as a baseline for comparison with other alternatives.

Alternative S2: Excavation and Landfill Disposal of Contaminated Soil from Primary Site-South and Storage Basin; Land Use Restriction on Athletic Field and Irrigation Field

Tar-contaminated soil at the Primary Site-South and the Storage Basin (mainly the Goodreau property) would be excavated and disposed of in a non-hazardous waste landfill. Deed notices or appropriate land use restrictions would be placed on the Primary Site to limit its use to industrial operations. Restrictions would be placed on the Storage Basin, Athletic Field, and Irrigation Field, mainly to prohibit the installation of new drinking water wells until groundwater cleanup standards are met.

Soil at the Primary Site-South would be excavated to a depth of about 8 feet. Excavations at the Storage Basin and the Goodreau property would be 1 foot deep. Sampling will be done to confirm that the removal met cleanup standards. Open excavations would be backfilled with clean soil, seeded, or covered with gravel, as appropriate.

No long-term maintenance or monitoring would be required after excavation and disposal of contaminated soil.

EPA estimates the present net worth cost of alternative S2 at $4.1 million. The estimated time to achieve cleanup goals is 6 months.

Alternative S3: Solidification/Stabilization of Contaminated Soil from Primary Site-South and Storage Basin; Land Use Restriction on Athletic Field and Irrigation Field

Contaminated soil from the Primary Site-South and the Storage Basin (including the Goodreau property) would be excavated, as described in alternative S2; then solidified and stabilized at the Primary Site. Deed notices or appropriate land use restrictions would be placed on the Primary Site to limit its use to industrial operations. Restrictions would be placed on the Storage Basin, Athletic Field, and Irrigation Field, mainly to prohibit the installation of new drinking water wells until groundwater cleanup standards are met.

Excavated material would be screened and crushed to ensure proper treatment (that is, solidification and stabilization). Demolished material would be disposed of as non-hazardous waste, as in alternative S2.

Sampling will be done to confirm that the removal met cleanup standards. Open excavations would be backfilled with clean soil, seeded, or covered with gravel, as appropriate.

Long-term effectiveness would be evaluated with the groundwater monitoring program developed for the groundwater alternative.

EPA estimates the present net worth cost of alternative S3 at $6.2 million. The estimated time to achieve cleanup goals is 13 months.

Alternative S4: Impermeable Capping of Contaminated Soil from Primary Site South; Excavation and Landfill Disposal of Contaminated Soil from Primary Site-South and Storage Basin; Land Use Restriction on Athletic Field and Irrigation Field

Alternative S4 uses the same technology as alternative S2, except contamination at the Primary Site-South would be excavated to a depth of 4 feet, with an impermeable cap placed over the remaining source.

The cap would consist of an impermeable layer of clay and polymeric liner, covered by a filter layer of sand and erosion control fabric. This cap would prevent rainwater from flushing through the source area and carrying contaminants to the groundwater. Periodic inspection and maintenance of the cap would be performed.

Deed notices or appropriate land use restrictions would be placed on the Primary Site to limit its use to industrial operations. Restrictions would be placed on the Storage Basin, Athletic Field, and Irrigation Field, mainly to prohibit the installation of new drinking water wells until groundwater cleanup standards are met.

EPA estimates the present net worth cost of alternative S4 at $2.7 million. The estimated time to achieve cleanup goals is 5 months.

Groundwater Alternatives

Alternative GW1: No Action

A no-action alternative is required by Superfund regulations to serve as a baseline for comparison with other alternatives.

Alternative GW2a: Groundwater Extraction with Treatment by Chemical Addition/ Microfiltration/Carbon Adsorption with Injection Galleries into Site Groundwater

Monitoring and extraction wells would be installed, and a groundwater treatment system would be constructed that removes organic contamination by carbon adsorption. Alternative GW2a includes an enhancement to the carbon adsorption process that changes inorganic contaminants into insoluble particles that can be filtered out of the water. Treated water would be injected back into the ground at the site.

EPA estimates the present net worth cost of alternative GW2a at $2.6 million. The estimated time to achieve cleanup goals is 11 years.

Alternative GW2b: Groundwater Extraction with Treatment by Chemical Addition/Microfiltration/ Carbon Adsorption and Discharge to Surface Water

Alternative GW2b uses a technology similar to what is used in alternative GW2a; however, treated water would be discharged (by permit) to the North Fork of Mill Creek.

In addition, about 1,100 feet of waterline, connected to the nearest existing public water main, would be installed to the Goodreau property to ensure a source of clean drinking water for future residents of this property.

This alternative requires long-term operations and maintenance and groundwater monitoring.

EPA estimates the present net worth cost of alternative GW2b at $2.5 million. The estimated time to achieve cleanup goals is 11 years.

Alternative GW3: Injection of Chemical Oxidant into Groundwater

A powerful chemical (oxidant) would be injected into the groundwater to destroy organic contamination and cause inorganic contaminants to precipitate out of the water. This alternative, which would require two oxidant injections, 3 months apart, to achieve cleanup goals, would result in contamination being partially removed and partially immobilized.

In addition, about 1,100 feet of waterline, connected to the nearest existing public water main, would be installed to the Goodreau property to ensure a source of clean drinking water for future residents of this property.

EPA estimates the present net worth cost of alternative GW3 at $3.8 million. The estimated time to achieve cleanup goals is 3 years.

Alternative GW4: In Situ Bioremediation with Oxygen Releasing Compound (ORC)

Alternative GW4 takes advantage of the biological transformation processes, likely are already taking place, to reduce the volume and toxicity of contamination in the groundwater.

Organic contaminants have been shown to degrade rapidly from natural processes in groundwater under aerobic conditions (bioremediation). Additional testing is needed to evaluate the degree of bioremediation at the Wrigley site.

Oxygen releasing compound (ORC) would be used to maintain aerobic conditions in the groundwater. The ORC would be placed into groundwater monitoring wells and replaced, as the material is dissolved into the groundwater. Additional monitoring wells may be installed to optimize groundwater monitoring and ORC treatment.

Groundwater monitoring would be conducted quarterly for the first 2 years, semi-annually for the following 3 years, and annually thereafter.

In addition, about 1,100 feet of waterline, connected to the nearest existing public water main, would be installed to the Goodreau property to ensure a source of clean drinking water for future residents of this property.

EPA estimates the present net worth cost of alternative GW4 at $1.3 million. The estimated time to achieve cleanup goals is 10 years.

Alternative GW5: Monitored Natural Attenuation

Monitored natural attenuation relies on natural processes, such as biological transformations and dispersion, dilution, and adsorption to reduce groundwater contamination. Groundwater would be tested periodically until contaminant levels drop below and stay below cleanup objectives for an extended period of time.

Monitored natural attenuation would be most successful if the source material at the site is treated or removed. Capping or excavating the site would also reduce rainwater from percolating through the source areas to contaminated groundwater.

Groundwater monitoring would be conducted quarterly for the first 2 years, semi-annually for the following 3 years, and annually thereafter.

In addition, about 1,100 feet of waterline, connected to the nearest existing public water main, would be installed to the Goodreau property to ensure a source of clean drinking water for future residents of this property.

EPA estimates the present net worth cost of alternative GW5 at $1.2 million. The estimated time to achieve cleanup goals is 30 years.

EPA Evaluation Criteria

How Evaluation Criteria are Used

In selecting a preferred cleanup alternative, the EPA uses the criteria presented here.

The first two must be met before an alternative is considered further.

The next five are used to further evaluate options.

The final two are then used to evaluate the remaining options after comments have been

- **Overall Protection of Human Health and the Environment**
  Assesses degree to which alternative eliminates, reduces, or controls health and environmental threats through treatment, engineering methods, or institutional controls.
- **Compliance with Applicable or Relevant and Appropriate Requirements**
  Assesses compliance with federal/state requirements.
- **Long-Term Effectiveness and Permanence**
  Degree to which a remedy can maintain protection of health and environment after cleanup goals have been met.
- **Reduction of Toxicity, Mobility, or Volume Through Treatment**
  The treatment's expected performance in reducing contaminant nature, movement, or amounts.
- **Short-Term Effectiveness**
  Potential impacts of construction or implementation of the remedy in the process of achieving cleanup goals.
- **Implementability**
  Refers to the technical feasibility and administrative ease of using the remedy.
- **Cost**
  Weighing remedy benefits against the implementation cost.

Evaluation of Alternatives

EPA evaluated each alternative using the Evaluation Criteria.

*1. **Overall Protection of Human Health and the Environment.*** Soil alternatives S2 and S3 would be the most protective of human health and the environment because soil in source areas would be cleaned up. Alternative S3 uses readily accepted technologies; however, little data is available to support the long-term effectiveness of the solidification/stabilization technology. Alternative S4 does not fully clean up source area contamination; however, an impermeable cap limits human health exposure and prevents rainwater from leaching soil contamination into groundwater.

Groundwater alternatives GW2a, GW2b, GW3, and GW4 are the most protective of human health and the environment because contaminant concentrations above cleanup goals would be actively addressed. In addition, alternatives GW2a, GW2b, GW3, GW4, and GW5 are most protective of human health at the Storage Basin area because waterline service would be installed to the Goodreau property. Injection of the chemical oxidant (alternative GW3) has the potential to be the most protective of the groundwater alternatives because treatment time is short; however, the effectiveness of this kind of treatment depends on selecting the proper reagent and reagent delivery system design to address site-specific conditions. Groundwater extraction and treatment (alternatives GW2a and GW2b) may take many years to achieve cleanup goals, but can be effective with the proper design and adjustment of the groundwater extraction well network and treatment system. Alternative GW5, natural attenuation, is becoming more widely accepted; however, it is a passive technology, and treatment times may be significantly longer than those for the other technologies under consideration.

*2. **Compliance with Applicable or Relevant and Appropriate Requirements (ARARs).*** All alternatives (except possibly no action) would comply with ARARs, given enough time.

*3. **Long-Term Effectiveness and Permanence.*** Alternatives S2, GW2a, GW2b, GW3, and GW4 would remove contaminants, resulting in the most effective and permanent solutions. In addition, alternatives S3 and S4 would meet cleanup goals and provide adequate effectiveness and permanence. Minimal risk is associated with alternatives S3 and S4 because contaminants are not removed permanently from the site. Long-term effectiveness of solidification and stabilization is unknown. Also, it is not known when alternative GW5 would be effective and permanent; although, it is possible that GW5 will achieve cleanup goals within 30 years.

Soil alternatives S2 through S4 would be effective, when construction activities are complete. Groundwater alternative GW3 would likely be effective within 3 years after construction is complete, although monitoring would be required to confirm effectiveness. The remaining groundwater alternatives require the longest times to achieve cleanup goals; estimates are from 3 to 10 years for groundwater extraction (GW2a and GW2b) to meet cleanup goals. Alternative GW4 operates under natural groundwater flow conditions; it is estimated that it will take 10 years to reach cleanup levels. Monitored natural attenuation (alternative GW5) would take 5 to 30 years to meet cleanup goals.

*4. **Reduction of Toxicity, Mobility, or Volume of Contaminants through Treatment.*** A reduction in toxicity, mobility, and volume would occur in alternatives S2 and S4 at the completion of construction. The reduction may occur in alternative GW3 within several years. The reduction would take much longer for alternatives GW2a, GW2b, GW4, and GW5 due to the nature of the groundwater contamination. Alternative S3 would reduce the mobility of contaminants because the flow of groundwater through the contaminated media would be reduced.

*5. **Short-Term Effectiveness.*** The risk to the community and workers would be minimal and controllable for all alternatives.

*6. **Implementability.*** Soil alternatives involve simple technologies that are easy to implement. Groundwater cleanup will be more complex. Alternatives GW2a and GW2b use extraction to reduce contaminant concentrations by applying proven technologies that can be readily implemented with proper data. Alternative GW3 is also a proven method for the treatment of organic and, to a lesser extent, inorganic contaminants. The exact spacing and placement of groundwater wells for ORC socks in alternative GW4 is a function of the hydrogeologic characteristics of the aquifer and degradation rates of organic contaminants; getting this data would require additional sampling and slug testing. Similarly, alternative GW5 will require additional data about water quality and aquifer conditions before the likelihood of natural attenuation can be assessed.

*7. **Cost.*** Alternative S4 (impermeable capping) is the least expensive ($2.7 million), primarily because it requires the least excavation. Alternative S3 (solidification/ stabilization) is the most expensive soil alternative ($6.2 million).

Groundwater alternatives GW4 and GW5 have an estimated present worth of $1.3 million and $1.2, respectively. Costs for extraction and treatment alternatives GW2a and GW2b were estimated to be $2.6 million and $2.5 million, respectively. The cost for alternative GW3, injection of chemical reagent into the aquifer, is the most expensive alternative: $3.6 million.

8. State Agency Acceptance. TDEC acceptance of the preferred cleanup alternative will be further evaluated after the public comment period ends and will be described in the record of decision for the site.

9. Community Acceptance. Community acceptance of the preferred cleanup alternative will be evaluated after the public comment period ends and will be described in the responsiveness summary portion of the record of decision for the site.

EPA's Preferred Cleanup Alternative

Based on available information, EPA believes soil alternative S2 and groundwater alternative GW4 provide the best balance in meeting the evaluation criteria. Together, alternatives S2 and GW4 form EPA's preferred alternative for the final cleanup at the Wrigley site. Total estimated present net worth cost for EPA's preferred alternative is $5.4 million.

Soil Alternative S2:

Excavation and Landfill Disposal of Contaminated Soil from Primary Site-South and Storage Basin; Land Use Restriction on Athletic Field and Irrigation Field

Estimated present net worth cost $4.1 million
Estimated time to achieve cleanup goals: 6 months

- Tar-contaminated soil at the Primary Site-South and the Storage Basin (mainly the Goodreau property) would be excavated and disposed of in a non-hazardous waste landfill. Deed notices or appropriate land use restrictions would be placed on the Primary Site to limit its use to industrial operations. Restrictions would be placed on the Storage Basin, Athletic Field, and Irrigation Field, mainly to prohibit the installation of new drinking water wells until groundwater cleanup standards are met.
- Soil at the Primary Site-South would be excavated to a depth of about 8 feet. Excavations at the Storage Basin and the Goodreau property would be 1 foot deep (estimated). Sampling will be done to confirm that the removal met cleanup standards. Open excavations would be backfilled with clean soil, seeded, or covered with gravel, as appropriate.

Groundwater Alternative GW4:

In Situ Bioremediation with Oxygen Releasing Compound (ORC)

Estimated present net worth cost $1.3 million
Estimated time to achieve cleanup goals: 10 years

- Organic contaminants have been shown to degrade rapidly from natural processes in groundwater under aerobic conditions (bioremediation). Oxygen releasing compound (ORC) would be used to maintain aerobic conditions in the groundwater. The ORC would be placed into groundwater monitoring wells and replaced, as the material is dissolved into the groundwater. Additional monitoring wells may be installed to optimize groundwater monitoring and ORC treatment.
- Groundwater monitoring would be conducted quarterly for the first 2 years, semi-annually for the following 3 years, and annually thereafter until cleanup levels are met.
- In addition, about 1,100 feet of waterline, connected to the nearest existing public water main, would be installed to the Goodreau property to ensure a source of clean drinking water for future residents of this property.

Rationale for Preferred Alternative

The factor driving the Wrigley site cleanup is the desire to improve groundwater quality. Tar and tar contaminated soil are probably leaching contaminants into the groundwater. EPA selected soil alternative S2 because it will achieve substantial and long-term risk reduction to groundwater through source removal. In addition, no long-term maintenance will be required with this soil remedy.

The preferred groundwater alternative was selected over the other alternatives because it is expected to achieve substantial risk reduction through treatment of contaminants in groundwater in a reasonable amount of time and at a reasonable cost. Waterline service to the Goodreau property will be provided in this alternative. The water line extension is a prudent measure to protect future downgradient residents until groundwater quality improves.

Groundwater quality will be evaluated for 6 to 12 months after the soil removal is completed to determine whether ORC treatment of groundwater is still necessary. EPA expects the soil removal to improve groundwater quality to a level where ORC treatment may not be needed. In any case, groundwater monitoring will be conducted until groundwater cleanup standards are met.

Deed restrictions will be used on the four areas of the Wrigley site. The Primary Site will continue to be used for industry, but should not be used for residential purposes. Current uses of Irrigation Field, Athletic Field, and Storage Basin can be continued; the primary restriction on these areas would be prohibiting new drinking water wells until groundwater cleanup standards are met.

Based on available information, EPA believes the preferred alternative (S2 and GW4) provides the best balance of tradeoffs among the four soil and six groundwater alternatives evaluated. EPA's preferred alternative protects human health and the environment, complies with applicable and appropriate regulations, is cost-effective, uses permanent solutions and resource recovery technologies to the maximum extent practicable, and satisfies the preference for treatment as a principal element. The preferred alternative can change in response to public comment or new information.

Community Participation

EPA encourages community involvement in the Wrigley site cleanup process through holding public meetings, maintaining the Administrative Record file, and publishing announcements in the *Hickman County Times* and *The Tennessean.*

The Administrative Record file contains all documents related to the Wrigley site. A copy of the Administrative Record file is available at the Wrigley site information repository and at Region 4 offices in Atlanta, Georgia.

Wrigley Site Information Repository

Hickman County Main Library
120 West Swan Street
Centerville, Tennessee 37033
Telephone: (931) 729-5130

Hours: Monday–10:30 - 7:00
Tuesday, Wednesday, and Friday–9:00 - 5:30
Thursday and Saturday–9:00-2:00
(The library is closed on Sundays and holidays.)

A copy of the Administrative Record file for the Wrigley Charcoal site is also available at:

EPA Region 4 Records Center
Attn: Debbie Jourdan
61 Forsyth Street
Atlanta, Georgia 30303
(404) 562-8862

Hours: Monday - Friday, 8:00 am to 5 pm

Public Meeting

Community members are invited to attend a public meeting about the cleanup alternatives considered and EPA's preferred alternative for the final cleanup of the Wrigley site.

Thursday, May 29, 2003
7:00 p.m.
East Hickman Elementary School
5191 Highway 100, Lyles, TN

At the meeting, EPA will present information about the alternatives and the preferred alternative, accept written and oral comments, and answer questions from the community.

Public Comment Period

EPA will accept public comments on the Wrigley Charcoal site final cleanup alternatives and preferred alternative from **May 19 through June 17, 2003**. All comments, written and oral, should be directed to:

Loften Carr, Remedial Project Manager
U.S. Environmental Protection Agency (11th Floor)
61 Forsyth St., SW, Atlanta, GA 30303
Phone: 404-562-8804
E-mail: Carr.Loften@epa.gov

EPA will consider all public comments before making a final decision for the Wrigley site.

PUBLIC COMMENT SHEET
for Wrigley Charcoal Site Proposed Plan

EPA encourages public input as an important contribution to the site cleanup process. Please send comments on the Focused Feasibility Study and the preferred cleanup alternative for the Wrigley Charcoal site, postmarked no later than June 17, to:

Loften Carr, Remedial Project Manager
U.S. Environmental Protection Agency (11th Floor)
61 Forsyth Street SW
Atlanta, GA 30303

Phone: 404-562-8804
Fax: 404-562-8788
E-mail: Carr.Loften@epa.gov
Toll-free: 800-435-9233

Name:_____ Phone:_____

Address:_____City/State:_____Zip:_____

Comments:_____

Fold on dashed line, staple, stamp and mail.
Name:_____
Address:_____
City:_____State:___Zip:_____

Place
Stamp
Here

Loften Carr
Remedial Project Manager
U.S. EPA Region 4 (11th Floor)
61 Forsyth Street, SW
Atlanta, GA 30303

ITEMS TO REMEMBER

Public Comment Period
May 19 to June 17, 2003

Public Meeting
Thursday, May 29, 2003
7 p.m.
East Hickman Elementary School
5191 Highway 100 in Lyles, Tennessee

Information is available for review
at the Wrigley Charcoal Site Information Repository
at the Hickman County Main Library
120 West Swan Street
Centerville, Tennessee 37033
Telephone: (931) 729-5130

and online at:

www.epa.gov/region4/waste/npl/npltn/wrigletn.htm

CONTACTS

Loften Carr
Remedial Project Manager
U.S. Environmental Protection Agency
Phone: 404-562-8804
E-mail: Carr.Loften@epa.gov

Diane Barrett
Community Involvement Coordinator
U.S. Environmental Protection Agency
Phone: 404-562-8489
E-mail: Barrett.Diane@epa.gov

EPA Toll-free number: 800-435-9233

U.S. Protection Agency, Region 4
(Loften Carr, 11th Floor)
61 Forsyth Street, NW
Atlanta, GA 30303

OFFICIAL BUSINESS
Penalty for Private Use $300

INSIDE: EPA Proposes Cleanup Plan for Wrigley Charcoal Site